

**METHOD OF PREPARING
POLY-SILICIC-FERRIC COAGULANT (PSFC)
FOR ELECTROSTATIC CHARGE IMAGE
DEVELOPING TONER**

CROSS-REFERENCE TO RELATED
APPLICATION

[0001] This application claims the benefit of Korean Patent Application No. 10-2015-0107416, filed on Jul. 29, 2015, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

[0002] 1. Field

[0003] The present disclosure relates to a coagulant particularly appropriate in preparation of a toner for electrostatic charge image development in an electro-photographic image forming apparatus.

[0004] 2. Related Art

[0005] Toners may be prepared by using various methods. For example, a toner may be prepared by using an emulsion aggregation (EA) method. The emulsion aggregation method generally includes dispersing and aggregating a binder resin latex, a colorant, and a releasing agent in an aqueous medium. An emulsifying agent is used for stable dispersion of the binder resin latex, colorant, and releasing agent. Then, a coagulant is added to a dispersion including binder resin latex particles, colorant particles, and releasing agent particles. In this regard, the binder resin latex particles, colorant particles, and releasing agent particles aggregate and thus form toner particles containing the binder resin, colorant, and releasing agent.

[0006] One of the most important factors with respect to growth of toner particles by aggregation is using a coagulant that has an appropriate aggregating strength so that a toner having a particle size within a desired range is mainly produced. In other words, a coagulant for a toner is required to have an appropriate aggregating strength so that production of fine toner particles and coarse toner particles can be lowered, thus, improving a yield of the toner particles having a desired size. Herein, the term “fine toner particles” refers to toner particles having a particle size that is smaller than the desired particle size, and the term “coarse toner particles” refers to toner particles having a particle size that is bigger than the desired particle size.

[0007] A poly-silicic-ferric coagulant (PSFC) has been studied as a coagulant used in the preparation of a toner by using an emulsion aggregation (EA) method in an aqueous medium. PSFC refers to a polysilicic acid attached with iron ions. The PSFC has been primarily used as a coagulant for water treatment. The coagulant for water treatment aggregates an organic material and fine particles in waste water to facilitate precipitation and removal of solid particles and an organic material from the waste water. Since a larger size of the aggregate results in a higher efficiency of precipitation and removal in water treatment, in general, a coagulant for water treatment, such as the PSFC, is required to form aggregates as large in size as possible.

[0008] On the other hand, in the preparation of a toner by using an EA method, both formation of fine particles having a particle size smaller than a desired size and formation of coarse particles having a particle size greater than a desired

size need to be suppressed. For example, when an aggregating strength of a coagulant for a toner is too weak, raw materials (that is, a binder resin latex, a colorant, and a releasing agent) do not aggregate effectively, and thus fine particles are formed, which results in a decrease in the yield of a toner having the desired particle size. When the aggregating strength of a coagulant for a toner is too strong, the raw materials excessively aggregate, and thus coarse particles are formed, which results in a decrease in the yield of a toner having the desired particle size. Also, when the aggregating strength of a coagulant for a toner is too weak or too strong, toner particles having an intended ratio of raw materials (that is, toner particles having substantially the same composition as a mixing ratio of raw materials) may not be formed. Therefore, the preparation of a toner by using an EA method needs a coagulant having a controlled aggregating strength.

[0009] However, in general, a conventional coagulant for water treatment, such as a PSFC, is not appropriate in suppressing formation of coarse particles, and thus, it is difficult to obtain the PSFC (e.g., the PSFC having the controlled aggregating strength) appropriate in the preparation of a toner by using an EA method.

SUMMARY

[0010] Provided is a method of preparing a poly-silicic-ferric coagulant (PSFC) having a controlled aggregate strength. In particular, provided is a method of preparing a PSFC for a toner which is used in toner preparation using an emulsion aggregation (EA) method, wherein the PSFC for a toner may effectively suppress both formation of fine particles having a particle size smaller than a desired size and formation of coarse particles having a particle size greater than a desired size.

[0011] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented embodiments.

[0012] According to an aspect of an embodiment, a method of preparing a coagulant for a toner includes polymerizing silicic acid in a silicic acid aqueous solution having a silicon content and a pH to form a polymerized silicic acid; and mixing iron ions and the polymerized silicic acid to produce the coagulant, wherein the silicon content, the pH, and a polymerization time of the polymerizing satisfy Formula 1 below:

$$\log_e T - (11.7 - 3.0 \times pH - 2.6 \times \log_e 2.139C) \leq 6.65 \quad \text{<Formula 1>}$$

[0013] wherein, T is a value in hours of the polymerization time, and C is a value in wt % of the silicon content.

DESCRIPTION OF EMBODIMENTS

[0014] Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the present embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, the embodiments are merely described below, by referring to the figures, to explain aspects. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0015] According to an aspect of the present disclosure, an embodiment of a method of preparing a poly-silicic-ferric